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the sequence may be included: the relative power and rate of division among them; the occurrence of the most satisfactory food conditions; specific excretion products, modifying the character of the water.

Fine (in the same Journal) makes a study of the chemical properties of the hay infusions and concludes that there is no intimately mutual relation between the sequence of the protozoa and the course of titratable acidity produced by the action of bacteria on the acid-yielding materials of the infusion.

INTERNAL FACTORS INFLUENCING SEX IN *HYDATINA SENTA*

Schull (Jour. Exp. Zool., Feb., 1912), summarizes some studies on the life cycle of *Hydatina senta*, as follows:

1. Long continued parthenogenesis is accompanied by a progressive decrease in the proportion of male-producers.

2. A similar decrease occurs in the size of family produced,—tho the author states that there seems to be no correlation between these two declines.

3. Individuals hatched from fertilized eggs are not only all females, but are all female-producers.

4. The sex is determined a generation in advance. That is to say, whether a given female is to be a male-producer or a female-producer (so far as the manure culture is concerned) is irrevocably decided during the growth period of the parthenogenetic egg from which the female hatches.

REINVIGORATION OF PARTHENOGERIC STRAINS OF *HYDATINA*

Whitney (Jour. Exp. Zool. Apr., 1912), finds in strains of this organism whose reproductive powers had declined thru 384 parthenogenetic generations, extending over a period of 29 months, that *inbreedings* of closely related individuals produced a slight increase in their reproductive powers; that *cross-breeding* of two such weakened races (altho originally derived parthenogenetically from the same stock) produced a sudden and pronounced increase in the rate of reproduction of the ensuing race.

CAN SPERM CELLS DEVELOP WITHOUT THE EGG?

Loeb and Bancroft (Jour. Exp. Zool. Apr., 1912), raise this interesting question and undertake to nurture spermatozoa in cul-

ture media. This experiment is the natural correlative of those which have shown that many ova may be stimulated artificially to produce embryos. In these studies the sperm cells of the chicken were used and were cultivated in egg yolk, egg albumen, chicken blood serum, and Ringer solutions.

It was found that spermatozoa did undergo some transformations. These include the shortening of the head, the formation of a vesicle about the head and middle piece, the dispersal thru the vesicle of the matter of the head, the gradual reformation of the chromatin into objects suggestive of chromosomes.

On the whole, while no evidence has been found that division can take place in the sperm outside the egg, the results thus far may be comprhended in the statement that the sperm is able to organize itself into something much resembling a nucleus.

ADAPTATION OF FISH TO TEMPERATURE

Loeb and Wasteneys (*Jour. Exp. Zool.*, May, 1912), inquire into the phenomena associated with adaptation to changed temperatures. It has long been known that animals may gradually be rendered immune to temperatures which applied outright would cause death.

In these experiments it was found that fish could be rendered immune to the hurtful effects of a sudden transfer to water of a temperature of 35°C by being placed for 30 hours or more in a temperature of 27°. Similarly they may be made immune to a temperature of 39°C. The ability to endure water at 35° was not lost or weakened by keeping the fish at a temperature of 10°-14° for 33 days after having been acclimatized to water at 27°; nor by keeping them for two days at a temperature of 0°.4C, after their two days exposure to 27°.

It was also found that fish could stand a sudden increase of temperature better with a higher concentration of sea-water up to a certain maximum solution—beyond which the ability again declined. This is thought to be due to specific effects of the salts rather than to changed osmotic conditions.

EFFECT OF CONTACT AND TENSION ON TENDRILS

Brush (*Bot. Gaz.* June, 1912), finds that the tendrils of Passi-